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JUNE 1985 NUMBER 202

MONTHLY REPORT

ON THE NUCLEAR FUEL MARKET

NUEXCO

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MONTHLY REPORT ON THE NUCLEAR FUEL MARKET

June 1985 No. 202

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To Our Readers

Nuexco would like to announce that **Scott Hickman,** Regional Marketing Manager in our European office, has been granted a two-year leave-of-absence to attend Harvard Business School. Scott left Nuexco at the end of May, and in the fall will pursue a master's degree in Business Administration. We wish him the best of luck in his studies. In the interim, Scott's clients will be handled by our European office.

* * *

Nuexco's US offices will be closed for the Independence Day holiday on Thursday, July 4, 1985.

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NATURAL URANIUM AND SECONDARY MARKET CONVERSION

The **Exchange Value** as of May 31, 1985 is **$15.00** per pound U_3O_8, up $0.75 since last month. **Active supply** of natural uranium (U_3O_8 and UF_6) for spot or near-term delivery totals **2,655,000** pounds equivalent U_3O_8 as concentrates or UF_6, down 65,000 pounds since last month. The corresponding figure for **active demand** is **940,000** pounds, down 455,000 pounds. The spot and near-term **supply-demand ratio** rose to **2.8:1.**

The *Current Market Data* section of this Report lists eight natural uranium sales transactions, involving a total of approximately 3,500,000 pounds U_3O_8 equivalent. Seven of the transactions reported this month involved deliveries before 1986, and six met the criteria for inclusion in the current Transaction Value calculation.

The **UF_6 Value** as of May 31, 1985, is **$42.50** per kilogram U in UF_6, up $2.00 since last month. One of the transactions reported this month involved UF_6.

The **Transaction Value** as of May 31, 1985 is **$14.45** per pound U_3O_8, down $0.45 since last month. The current Transaction Value includes 20 transactions involving a total of 4.6 million pounds U_3O_8 or equivalent UF_6 and covers a period of 3 months. The Transaction Value continues to fall as expected due to the inclusion in the calculation of transactions from the past three months, most of which took place at prices in the $14.00 to $15.00 range.

The **Loan Use Charge Rate** as of May 31, 1985 is unchanged at **5 percent** per annum, as a transaction was concluded at that rate and a lender continued to offer a substantial quantity of material at that rate.

* * *

The substantial rise in this month's Exchange Value is largely attributable to the firming of the market that occurred following the liquidation of a US producer's inventory at prices near $14.00 in the beginning of May. By the following week, few active sellers remained willing to offer prices at that level, and a gap developed between sellers' offers in the $15.00 range and discretionary buyers' interest level below $14.50. Consequently, there was little activity in mid-May. In the last week of the month, several transactions involving smaller lots of material took place, and some buyers expressed a willingness to pay above $14.50. Thus, the market appears to have stabilized temporarily at the $15.00 level.

Current market participants can be divided into four general groups:

Distress sellers. This class of sellers is comprised of utilities and producers that have decided to sell inventory at whatever price is necessary to generate cash. While utilities having canceled or long-delayed plants have dominated this category, a number of producers having chosen to leave the uranium business or liquidate stagnant lots of material also have contributed to this category, as demonstrated in April and May. Distress sellers evidently have led the spot uranium price recently with sales in the range of $14.00-$14.50 per pound U_3O_8 and $40.00-$41.00 per kilogram U in UF_6.

Discretionary sellers. This term applies to low-cost producers, traders, and financially sound utilities that wish to sell uranium but only at what are perceived to be acceptable prices, either relative to the Exchange Value or relative to actual production costs. Traders having excess quantities of uranium have been active in this regard for small quantities of material, while Canadian producers have led this class of seller for larger quantities. Discretionary sellers recently have shown interest in prices approaching $15.00 per pound U_3O_8 and $43.50 per kgU in UF_6.

Discretionary buyers. This term applies to utilities and trading companies that wish to take advantage of bargain prices despite having no immediate need for uranium. In the case of utilities having unfilled requirements in the immediate term, discretionary purchases can be added to inventory and used to defer requirements. In the case of traders, such purchases may be made in the anticipation that the material can be resold subsequently at higher prices. Discretionary buyers' interest level currently approaches $14.75 per pound U_3O_8 and $42.00 per kgU in UF_6.

Firm buyers. This class of buyer includes utilities and producers that must meet actual near-term requirements, as well as companies that have made firm decisions to buy regardless of small spot price fluctuations. A buyer needing immediate deliveries of uranium obviously will pay whatever price is necessary to meet his schedule, and if no distress sellers are in the market at the time his decision is made, the actual price he pays may exceed other prices paid in recent transactions. Current firm buyers may pay as high as $15.50 per pound U_3O_8 or $44.00 per kgU in UF_6 in order to meet requirements. Buyers demanding specific material origin, form or delivery location also may pay a premium above other transaction prices.

* * *

The upward turn in the Exchange Value this month represents only the third reversal in a downward price

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trend that began in August 1978. The first consistent decline in spot prices started at the $43.40 level and reached a low of $17.00 in September 1982. The first reversal occurred in October 1982 and lasted for only 12 months, as prices peaked at $24.00 in September 1983. The downward trend resumed, reversing for a single month in April 1984 before reaching a new low of $14.25 in April 1985.

As expected, the volume of material sold for spot and near-term deliveries tended to peak when prices were approaching or reaching low points. Thus, in the periods of mid-1982, late 1983 and late 1984 to early 1985, considerable activity took place. As uranium prices declined, discretionary buyers became increasingly interested in the bargain prices offered by distress sellers which were forcing material onto the market. In the past several months, discretionary buyers have been faced with a conflicting option:

1. Purchasing material immediately to take advantage of the inventory clearances could result in a missed opportunity to buy at even lower prices one or two months later.
2. Conversely, deferring immediate purchases in the hopes that the downward price trend will continue runs the risk that prices may reverse and current prices will be unattainable later.

To date, however, upward price movement has not been sustainable primarily due to two effects of such upward movement. First, each rise stimulated new liquidations of inventory. Second, willing buyers are necessary in order to sustain the higher price levels, yet such buyers have tended to withdraw as soon as any price-firming is detected. The current upturn could trigger a repeat of these phenomena. However, the industry is recognizing that distress sellers enter the market one at a time as their selling mode is triggered by some external event, and withdraw from the market singly as their material is absorbed. An industry perception that distress selling is approaching an end could stimulate a surge of activity as buyers compete for the final lots of inventory at below-market prices. In addition, sustainable higher prices require not only an end to inventory liquidation, but also a constant buyer presence. To the extent that many buyers have filled a portion of their longer-term needs through discretionary buying practices in the past year, they are unlikely to provide a continuing demand which will sustain higher prices in the near term. Any such demand will have to come from other buyers with definite intermediate or longer-term needs. These buyers are likely to contract with producers instead of inventory liquidators, and prices driven by production costs can be anticipated.

A transition to this type of market environment is inevitable, but the change is apt to be more gradual and subtle than abrupt and easily defined. As more inventory is absorbed by the market, the timing of market activities becomes more important for buyers and sellers alike.

* * *

The **UF_6 Value** rose to **$42.50** in conjunction with the rise of the Exchange Value, primarily due to the minimal amount of natural uranium available in the present market. A high availability of UF_6 would result in lower prices for utilities purchasing UF_6 rather than obtaining concentrates and secondary market conversion services. In the former case, the UF_6 Value would be slightly less than the sum of the Exchange Value and the Conversion Value. However, at present the two options for acquiring UF_6 are equally cost-effective.

* * *

The **Conversion Value** is **$1.50** per pound U in UF_6, unchanged since last month. One secondary market conversion transaction is reported. Active supply of secondary market conversion services for delivery within three years totals 1.6 million pounds U as UF_6. Active secondary market demand for conversion amounts to 965,000 pounds U in UF_6.

The secondary market for conversion services remains marginally active, with transaction prices stabilized in the $1.45 to $1.75 range. Without a large supply of UF_6 available at prices beneath the sum of the Exchange Value and Conversion Value, some discretionary buyers are electing to wait for low-priced U_3O_8 to appear, as in the beginning of May, and purchasing conversion services for that material immediately.

ENRICHED URANIUM AND SWUS

The Nuexco **SWU Values** as of May 31, 1985 are:

1. For **DOE origin,** a tails assay of 0.30 weight-percent U_{235}, for delivery by the end of FY86, and certifiable as excess, $90 per SWU, down $5.
2. For **other SWUs** (includes DOE origin SWUs not certifiable as excess and non-DOE origin SWUs):
   a. For delivery in calendar year 1985, $80 per SWU, unchanged;
   b. For delivery in calendar year 1986, $85 per SWU, unchanged.

Two secondary market SWU transactions are reported, involving 500 thousand SWUs of DOE and Eurodif origin.

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Relatively little activity took place in the secondary market for either certifiable or non-certifiable SWUs. Aggressive sellers of DOE-certifiable SWUs continue to lower their prices to complete transactions. While no real market for FY85 deliveries exists, there are some opportunities for FY86 DOE SWUs. However, the buyers having actual requirements in FY86 that can be filled on the secondary market are at present evaluating purchasing strategies and still are not compelled to act immediately.

The lack of activity in the market for other SWUs continued, and prices remained at the levels established last month. As in the DOE-certifiable market, FY86 buyers of other SWUs are examining the various options available to them, including the Eurodif responses to DOE's incentive-pricing campaign.

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CURRENT MARKET DATA

May 31, 1985	Market Values	Active Supply[1] (thousands)	Active Demand[1] (thousands)
EXCHANGE VALUE	**$15.00**/lb. U_3O_8	2,655	940
UF_6 VALUE	**$42.50**/kgU		
CONVERSION VALUE	**$1.50**/lb. U in UF_6	1,600	965
SWU VALUES			
DOE origin, certifiable as excess, 0.3 tails assay delivery by the end of FY86	**$90**/SWU		
Other SWUs (non-DOE or non-certifiable)			
calendar year 1985 delivery	**$80**/SWU		
calendar year 1986 delivery	**$85**/SWU		
LOAN USE CHARGE RATE	5%/annum	0	300

TRANSACTION VALUE	$/lb. U_3O_8	Millions of Pounds	Number of Transactions	Number of Months
	14.45	4.6	20	3

[1]Supply and demand tables in the *Current Market Data* section of this Report detail the numbers for each category.

DEFINITIONS

1. The **Exchange Value** is Nuexco's judgment of the price at which transactions for significant quantities of natural uranium concentrates could be concluded as of the date indicated.
2. The **UF_6 Value** is Nuexco's judgment of the price at which spot and near-term transactions for significant quantities of natural uranium hexafluoride could be concluded as of the date indicated.
3. The **Conversion Value** is Nuexco's judgment of the price at which spot and near-term transactions for significant quantities of conversion services could be concluded in the secondary market as of the date indicated.
4. The **SWU Values** represent Nuexco's judgment of the price at which transactions for the sale of significant quantities of SWUs of stated origin for delivery in the specified time period could be concluded as of the date indicated.
5. The **Loan Use Charge Rate** is Nuexco's judgment of the annual interest rate at which uranium loans could be concluded as of the date indicated.
6. The **Transaction Value** is a weighted average price of recent natural uranium sales transactions. The calculation is based on prices paid in:
   a. Transactions closed within the previous three-month period for which delivery is scheduled within one year of the transaction date;
   b. At least ten transactions;
   c. Transactions involving a sum total of at least 2 million pounds U_3O_8 equivalent.

   The sample time is extended as necessary to include these minima. Other currencies are converted to US dollars using conversion rates in effect on or near the transaction date.

DERIVATIONS AND COMMENTS

1. All Market Values are based on:
   a. Data from recently completed transactions.
   b. Data from pending transactions.
   c. Firm bids to buy or borrow, and firm offers to sell or lend.
   d. Prices purchasers or rates borrowers have expressed a willingness to pay, but for which Nuexco is not aware of firm bids to buy or borrow, and prices sellers or rates lenders have expressed a willingness to offer, but for which Nuexco is not aware of firm offers to sell or lend.
2. Prices associated with deliveries under old or renegotiated contracts or other than arm's-length transactions are not considered in the determination of these Market Values.
3. In the determination of the Conversion Value, Nuexco does not consider transportation charges other than those customarily provided by primary suppliers of conversion services.
4. The prices of conversion services or SWUs delivered under long-term contracts with primary suppliers are not considered in the determination of either the Conversion Value or SWU Value.
5. For the DOE SWU Values, Nuexco converts SWU prices at varying tails and product assays to equivalent SWU prices at a tails assay of 0.30 weight-percent U_{235} and a product assay of 3.0 weight-percent U_{235}, assuming feed costs corresponding to the Nuexco Exchange and Conversion Values determined as of the same date.
6. In calculating the Transaction Value, Nuexco does not account for the price of uranium delivered in connection with contracts which call for "market price" mechanisms. This exclusion applies particularly to contracts in which delivery prices are expressed as a function of future Exchange Values or any other indeterminant variable. Also excluded from the calculation are any other transactions in which the delivery price is defined in such a way that it cannot currently be determined.

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CURRENT MARKET DATA

EXCHANGE VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates			per kg. U in Concentrates		
	This Month (May 31, 1985)	Last Month (Apr. 30, 1985)	12 Months Ago (May 31, 1984)	This Month (May 31, 1985)	Last Month (Apr. 30, 1985)	12 Months Ago (May 31, 1984)
Australia (dollar)	22.56	21.72	19.74	58.64	56.47	51.33
Belgium (comm. franc)	931.68	891.18	986.66	2,422	2,317	2,565
Canada (dollar)	20.64	19.49	22.97	53.67	50.66	59.72
Finland (markka)	95.97	92.47	102.84	249.50	240.41	267.36
France (franc)	140.98	135.46	148.91	366.51	352.16	387.13
FRG (mark)	46.30	44.36	48.51	120.36	115.34	126.12
Italy (lira)	29,492	28,274	29,963	76,674	73,506	77,897
Japan (yen)	3,773	3,598	4,107	9,810	9,355	10,677
Netherlands (guilder)	52.16	50.09	54.72	135.59	130.22	142.25
South Africa (rand)	29.97	27.75	22.73	77.92	72.15	59.09
Spain (peseta)	2,612	2,492	2,726	6,792	6,479	7,087
Sweden (krona)	133.45	128.49	143.49	346.95	334.06	373 05
Switzerland (franc)	39.00	37.23	40.12	101.40	96.78	104.31
UK (pound)	11.77	11.58	12.81	30.61	30.10	33.29
US (dollar)	15.00	14.25	17.75	39.00	37.05	46.15

TRANSACTION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U_3O_8 in Concentrates			per kg. U in Concentrates		
	This Month (May 31, 1985)	Last Month (Apr. 30, 1985)	12 Months Ago (May 31, 1984)	This Month (May 31, 1985)	Last Month (Apr 30, 1985)	12 Months Ago (May 31, 1984)
Australia (dollar)	21.73	22.71	18.91	56.49	59.05	49.16
Belgium (comm. franc)	897.52	931.83	944.97	2,333	2,423	2,457
Canada (dollar)	19.89	20.37	22.00	51.70	52.97	57.20
Finland (markka)	92.45	96.69	98.49	240.35	251.37	256.06
France (franc)	135.81	141.64	142.62	353.07	368.22	370.77
FRG (mark)	44.60	46.39	46.46	115.95	120.60	120.79
Italy (lira)	28,411	29,563	28,697	73,863	76,858	74,605
Japan (yen)	3,635	3,763	3,933	9,450	9,782	10,226
Netherlands (guilder)	50.24	52.37	52.40	130.62	136.16	136.24
South Africa (rand)	28.87	29.02	21.77	75.06	75.44	56.59
Spain (peseta)	2,516	2,606	2,611	6,543	6,775	6,788
Sweden (krona)	128.56	134.36	137.43	334.22	349.29	357.29
Switzerland (franc)	37.57	38.92	38.43	97.68	101.19	99.90
UK (pound)	11.34	12.10	12.27	29.49	31.47	31.89
US (dollar)	14.45	14.90	17.00	37.57	38.74	44.20

[1]Calculated using currency exchange rates published in the *Wall Street Journal* on May 31, 1985.

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CURRENT MARKET DATA

CONVERSION VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	per lb. U as UF_6			per kg. U as UF_6		
	This Month (May 31, 1985)	Last Month (Apr. 30, 1985)	12 Months Ago (May 31, 1984)	This Month (May 31, 1985)	Last Month (Apr. 30, 1985)	12 Months Ago (May 31, 1984)
Australia (dollar)	2.26	2.29	0.89	4.97	5.04	1.96
Belgium (comm. franc)	93.17	93.81	44.47	205.40	206.81	98.04
Canada (dollar)	2.06	2.05	1.04	4.55	4.52	2.28
Finland (markka)	9.60	9.73	4.64	21.16	21.46	10.22
France (franc)	14.10	14.26	6.71	31.08	31.43	14.80
FRG (mark)	4.63	4.67	2.19	10.21	10.30	4.82
Italy (lira)	2,949	2,976	1,350	6,502	6,561	2,977
Japan (yen)	377.36	378.79	185.10	831.93	835.08	408.07
Netherlands (guilder)	5.22	5.27	2.47	11.50	11.62	5.44
South Africa (rand)	3.00	2.92	1.02	6.61	6.44	2.26
Spain (peseta)	261.28	262.33	122.87	576.02	578.34	270.88
Sweden (krona)	13.35	13.53	6.47	29.42	29.82	14.26
Switzerland (franc)	3.90	3.92	1.81	8.60	8.64	3.99
UK (pound)	1.18	1.22	0.58	2.60	2.69	1.27
US (dollar)	1.50	1.50	0.80	3.31	3.31	1.76

SWU VALUES AND UF_6 VALUE EXPRESSED IN SELECTED PRODUCER & CONSUMER CURRENCIES[1]

Country (currency)	DOE SWU Delivery by the End of FY86 (May 31, 1985)	Non-DOE SWU 1985 Delivery (May 31, 1985)	Non-DOE SWU 1986 Delivery (May 31, 1985)	UF_6 per kg. U in UF_6 This Month (May 31, 1985)	UF_6 per kg. U in UF_6 Last Month (April 30, 1985)
Australia (dollar)	135.34	120.30	127.82	63.91	61.74
Belgium (comm. franc)	5,590	4,968	5,279	2,639	2,533
Canada (dollar)	123.86	110.10	116.98	58.49	55.38
Finland (markka)	575.82	511.84	543.83	271.91	262.82
France (franc)	845.86	751.88	798.87	399.44	384.98
FRG (mark)	277.78	246.91	262.35	131.17	126.09
Italy (lira)	176,956	157,294	167,125	83,562	80,357
Japan (yen)	22,641	20,125	21,383	10,691	10,227
Netherlands (guilder)	312.93	278.16	295.55	147.77	142.36
South Africa (rand)	179.82	159.84	169.83	84.92	78.87
Spain (peseta)	15,676	13,934	14,805	7,402	7,083
Sweden (krona)	800.71	711.74	756.23	378.11	365.19
Switzerland (franc)	234.01	208.01	221.01	110.50	105.80
UK (pound)	70.65	62.80	66.72	33.36	32.90
US (dollar)	90.00	80.00	85.00	42.50	40.50

[1]Calculated using currency exchange rates published in the *Wall Street Journal* on May 31, 1985.

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RECENT TRANSACTIONS[1]

Uranium Sales

Nuexco Transaction Number	Delivery Period	Approximate Quantity (thousands of pounds, U_3O_8 equivalent)	Approximate Price as Percent of Current E.V.	Seller	Buyer	Remarks
3454	1985	50-100	94	US Producer	US Utility	
3452	1985	50-100	96	US Producer	US Utility	
3438	1985	1,001-1,500	97	US Utility	Far East Utility	
3425	1985	301-600	indeterminate	US Producer	US Producer	Market-related price.
3424	1985	101-300	97	R[2]	European Utility	UF_6.
3419	1985	301-600	96	US Producer	European Utility	
3418	1985	101-300	95	Trader	US Utility	
3416	1987-1988	101-300	144	US Producer	US Producer	

[1]Transactions listed are not limited to those in which Nuexco was involved, but also include others of which Nuexco is aware.
[2]The notation *R* means that Nuexco either does not know, or that Nuexco has restricted that information to protect client confidentiality.

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CURRENT MARKET DATA

RECENT TRANSACTIONS[1] *(continued)*

Loan Transactions

Nuexco Transaction Number	Delivery Period	Approximate Quantity (thousands of pounds, U_3O_8 equivalent)	Approximate Price as Percent of Current L.U.C.R.	Lender	Borrower
3451	1985	50-100	100	European Entity	Trader

Secondary Market Conversion Services

Nuexco Transaction Number	Delivery Period	Approximate Quantity (thousands of pounds, U equivalent)	Approximate Price as Percent of Current C.V.	Seller	Buyer	Remarks
3426	1987-1988	301-600	indeterminate	Fabricator	European Utility	Price escalated from contract signing.

Enrichment Services
Secondary Market Sales

Nuexco Transaction Number	Delivery Period	Approximate Quantity[2] (thousands of SWUs)	Approximate Price[3] as Percent of Current SWU Value[4]	Seller Group	Buyer Group	SWU Origin	Remarks
3453	1986	301-600	91	European Entity	US Utility	Eurodif	
3410	1985	50-100	106	US Utility	European Utility	DOE	

[1]Transactions listed are not limited to those in which Nuexco was involved, but also include others of which Nuexco is aware.
[2]If tails assay is unknown or unspecified, Nuexco's calculation of SWU quantity assumes 0.30 w/o tails assay.
[3]Price is not normalized to 0.30% tails assay.
[4]Refers to SWU Value that corresponds to SWUs included in transaction. When prices and SWU values are expressed as discounts (e.g., X dollars less than DOE's USEC base price at time of delivery), the percentage refers to the ratio of the *discounts*, not the ratio of the prices.

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CURRENT MARKET DATA

URANIUM SUPPLY
(May 31, 1985)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Available for Sale:			
ACTIVE			
1575	500	500 per year	
1860	400	1,500 per year	
2134*	50	220 per year	1985-87
2392	35	—	UF_6
2538*	100	—	
2538B*	150	—	
2594	20	20 per year	1985-90
2673*	1,200	—	UF_6
2705A	200	—	UF_6
2263	—	500 per year	1987-90
2625	—	250 per year	1987-89
2680	—	250 per year	1986-92
TOTAL:	2,655		
INACTIVE			
2191	125	—	UF_6
2335	275	—	
2336	250	250 per year	1985-94
2389*	300	—	
2553	300	—	
2654	250	250 per year	UF_6
2297	—	200 per year	1986-89
2670	—	525	1987
TOTAL:	1,500		

*New or revised since last month.
[1]Measured from the date of this Report.
[2]For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.
Projects removed since last month: 2510, 2675.

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CURRENT MARKET DATA

URANIUM DEMAND
(May 31, 1985)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Inquiries to Purchase:			
ACTIVE			
2548	290	—	
2590	75	—	U_3O_8 or UF_6
2636	100	—	
2699*	100	—	U_3O_8 or UF_6
2716*	150	—	UF_6
2748*	25	75	
2751*	200	—	
2217	—	1,000 per year	1989-95
2507	—	600	1987-89
2681	—	1,000 per year	1987-88
TOTAL:	940		
INACTIVE			
2576	20	—	UF_6
2695	1,250	—	UF_6
2414	—	365	1987-88
2457B	—	650	1987
2586	—	300	1987
2643	—	150 per year	1987 on
2694	—	625	1987; UF_6
TOTAL:	1,270		

*New or revised since last month.
[1]Measured from the date of this Report.
[2]For delivery within one year. This category excludes material deliverable within one year under other than spot or near-term contracts.
Projects removed since last month: 2674.

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LOAN SUPPLY AND DEMAND
(May 31, 1985)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U_3O_8) Within 1 Year	Beyond 1 Year	Remarks
Available for Loan:			
INACTIVE			
1938	2,000	—	UF_6
2036*	500	—	
2469A	800	—	
2483	550	—	
2667	800	—	
TOTAL:	4,650		
Inquiries to Borrow:			
ACTIVE			
2606*	300	—	
TOTAL:	300		

*New or revised since last month.
[1]Measured from the date of this Report.
Projects removed since last month: 2139.

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CURRENT MARKET DATA

CONVERSION SUPPLY AND DEMAND
(May 31, 1985)

Nuexco Project Number	Delivery Period[1] (Thousands of Pounds U as UFs) Within 3 Years	Beyond 3 Years	Remarks
Available for Sale:			
ACTIVE			
1936*	440	550	1986-89
2511*	300	300	1986-90
2677*	500	—	
2725*	360	—	
TOTAL:	1,600		
INACTIVE			
2438	500	250 per year	1986-87
TOTAL:	500		
Inquiries to Purchase:			
ACTIVE			
2419A	55	—	
2587	35	—	
2596*	600	—	
2617*	275	420	1986-91
TOTAL:	965		
INACTIVE			
2529	225	—	
2724	—	375	1989-93
TOTAL:	225		

*New or revised since last month.
[1]Measured from the date of this Report.
Projects removed since last month: 2051, 2602, 2644.

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SWU SUPPLY
(May 31, 1985)

Nuexco Project Number	Delivery Period[1] (Thousands of SWUs) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Available for Sale:			
ACTIVE			
2607*	350	—	
2624	100	—	
2633B	330	—	
2705	40	—	
2359	—	200	
2410A*	—	350	
2571	—	55	1987
2684	—	35	
TOTAL:	820		
INACTIVE			
2164	20	—	
2378	—	120	1988
2652	—	25	1986
TOTAL:	20		

*New or revised since last month.
[1]Measured from the date of this Report.
[2]For delivery within one year. This category excludes SWUs deliverable within one year under other than spot or near-term contracts.
Projects removed since last month: 2517.

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CURRENT MARKET DATA

SWU DEMAND
(May 31, 1985)

Nuexco Project Number	Delivery Period[1] (Thousands of SWUs) Spot or Near-term[2]	Intermediate or Long-term	Remarks
Inquiries to Purchase:			
ACTIVE			
2400	—	150	1987-90
2519	—	30 per year	1987 on
2597*	—	30	
2658	—	5	1986
2706*	—	30	
2726*	—	5	
2713	180	—	
TOTAL:	180		
INACTIVE			
2543	25	25	1986
2500	—	170	1988
2512	—	15 per year	1987 on
2595	—	50	1986
2693	—	100 per year	1989-90
TOTAL:	25		

*New or revised since last month.
[1]Measured from the date of this Report.
[2]For delivery within one year. This category excludes SWUs deliverable within one year under other than spot or near-term contracts.
Projects removed since last month: 2585, 2653, 2655.

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THE NUCLEAR FUEL MARKET IN THE FEDERAL REPUBLIC OF GERMANY

Introduction

The nuclear fuel market in the Federal Republic of Germany (FRG) is decentralized and highly competitive compared to those of other countries outside the USA. Most other countries have few companies (often state-owned) participating in the market, and sometimes only one. The market in Germany, however, is diversified internally; headquarters for several internationally active nuclear fuel businesses are located in the FRG. Seventeen nuclear power units are in commercial operation in the FRG and six are under construction; more than twenty-five different companies own direct shares in those units. While little uranium is produced domestically, at least six independent non-utility companies take principal positions in the nuclear fuel market, buying or selling uranium for their own accounts.

Nuclear Fuel Demand

As in the USA and many other countries, far fewer units have been built in the FRG than were originally planned in the 1960s and 1970s, and no new units are likely to be ordered in the foreseeable future (Figure 1 and Table 1). As elsewhere, reductions in planned capacity resulted from political delays, cost escalations, and declining electricity demand.

Recently the utilities and the primary German vendor, Kraftwerk Union (KWU), have made noteworthy progress toward bringing the backlog of ordered units into operation. In the past eighteen months, six units have begun operation, adding some 6,000 MWe of capacity to the national grid. Five of those units were built by KWU and one, the THTR at Hamm-Uentrop, by a consortium led by Brown Boveri (BBC). The utilities have profited from KWU's construction experience and the generally favorable political environment at the federal and state levels. The Christian Democrats (CDU), who currently have a majority in the federal parliament and in six of the eleven state governments, have strongly supported the utilities (Table 2). The opposition Social Democrats (SPD) have generally assented to nuclear power development, except in regions where coal interests or Green Party activists are particularly influential, as in the Saarland and in Hesse.

Figure 2 diagrams the ownership of all commercial units except for the Kalkar fast-breeder reactor, which is a joint European project. Figure 3 shows the service areas of the nine major regional utilities. HEW, NWK and PREAG are the principal utilities in the northern and eastern states of Schleswig-Holstein, Lower Saxony and Hesse; VEW in western Lower Saxony and northern North-Rhine Westphalia; RWE in North-Rhine Westphalia and Rhineland Palatinate; Badenwerk, EVS, and Neckarwerke in Baden-Wuerttemberg; and Bayernwerk and Isar-Amperwerke in Bavaria. RWE is the country's largest utility, followed by PREAG, a wholesale utility and a 69.4-percent owner of NWK.

Most FRG nuclear units are owned by utility consortia, with each consortium led by one or more of the principal utilities. A subsidiary or consortium formed solely to build and operate a nuclear plant can be recognized by the German word *Kernkraftwerk* (nuclear power plant). For example, the consortium owning the Obrigheim unit is Kernkraftwerk Obrigheim GmbH (KWO), and that operating the two-unit Neckar plant is Gemeinschaftskernkraftwerk Neckar GmbH (GKN).[1]

Due to long-term contracting and the accumulation of inventories during the years that plant constructions were delayed, few of the German utilities have unfilled uranium requirements for the intermediate term. One utility has an inventory valued internally at over 1 billion Deutschmarks (330 million dollars). Nuexco estimates that the total national inventory exceeds 35 million pounds U_3O_8 equivalent. Much of the material is stored domestically. Over 7 million pounds U_3O_8 equivalent are owned by the German government and constitute a strategic reserve; the material was acquired from the USA during the 1970s to offset US military expenditures in the FRG. Commercial reprocessing, which is pursued by several of the utilities, also has reduced unfilled requirements.

[1]The abbreviation *GmbH* (Gesellschaft mit beschraenkter Hastung) indicates that a company's capital is held by two or more shareholders, but is not publicly traded, while the abbreviation *AG* (Aktiengesellschaft) indicates that shares in the company are bought and sold on the public stock exchange.

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Table 1

NUCLEAR POWER UNITS IN THE FEDERAL REPUBLIC OF GERMANY

Lead Utility and Fuel Buyer	Unit	MWe	Type	COD[1]	Percent Complete
BW/EVS	Philippsburg 1	864	BWR	2/80	100
	Philippsburg 2	1268	PWR	5/85	100
BAG	Grafenrheinfeld	1235	PWR	6/82	100
	Isar 1	870	BWR	3/79	100
	Isar 2*	1285	PWR	4/89	45
GKN	GKN 1	795	PWR	12/76	100
	GKN 2*	1230	PWR	6/89	25
HEW	Brunsbuettel	771	BWR	2/77	100
	Kruemmel	1260	BWR	3/84	100
KWO	Obrigheim 1	328	PWR	3/69	100
NWK	Stade	630	PWR	5/72	100
	Unterweser	1230	PWR	10/79	100
	Brokdorf*	1290	PWR	6/87	70
PREAG	Wuergassen	640	BWR	3/72	100
	Grohnde	1290	PWR	2/85	100
RWE	Biblis A	1146	PWR	3/75	100
	Biblis B	1240	PWR	1/77	100
	Gundremmingen B	1244	BWR	7/84	100
	Gundremmingen C	1244	BWR	6/85	100
	Kaerlich*	1227	PWR	8/86	90
SBK	Kalkar*	295	LMFBR	4/87	85
VEW	THTR 300	296	HTR	7/85	100
	Emsland*	1242	PWR	10/88	40
		22,910			

BW = Badenwerk AG
BAG = Bayernwerk AG
EVS = Energieversorgung Schwaben AG
GKN = Gemeinschaftskernkraftwerk Neckar GmbH
HEW = Hamburgische Elektrizitaetswerke AG
KWO = Kernkraftwerk Obrigheim GmbH
NWK = Nordwestdeutsche Kraftwerk AG
PREAG = Preussische Elektrizitaets AG
RWE = Rheinisch-Westfaelisches Elektrizitaetswerk AG
SBK = Schnell-Breuter Kernkraftwerksgesellschaft mbH
VEW = Vereinigte Elektrizitaetswerke Westfalen AG

*Unit under construction.
[1]Commercial Operating Date.

Table 2

POLITICAL SUBDIVISIONS IN THE FRG ***(See Figure 1)***

State	Number of Nuclear Units	Governing Political Party
1. Schleswig-Holstein	3	CDU (Christian Democratic Union)
2. Hamburg	0	SPD (Social Democratic Party)
3. Bremen	0	SPD
4. Lower Saxony	4	CDU
5. Berlin	0	CDU/FDP (Free Democratic Party)
6. North-Rhine Westphalia	3	SPD
7. Hesse	2	SPD
8. Rhineland Palatinate	1	CDU
9. Saarland	0	SPD
10. Baden-Wuerttemberg	5	CDU
11. Bavaria	5	CSU (Christian Social Union)
Total FRG	23	CDU

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Figure 1

NUCLEAR POWER UNITS IN THE FRG

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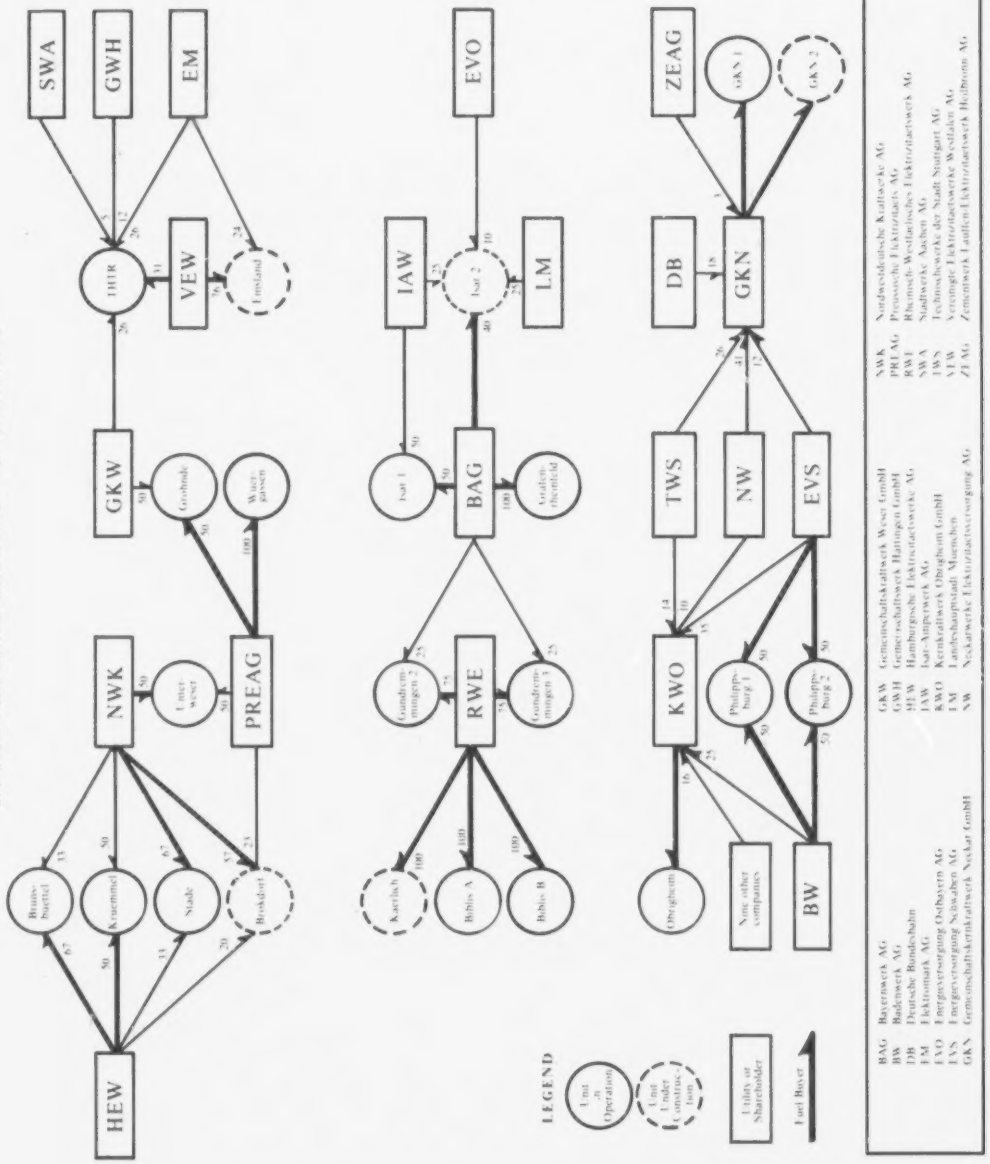
Figure 2

NUCLEAR POWER PLANT OWNERSHIP IN THE FEDERAL REPUBLIC OF GERMANY



The ownership figures in Figure 2 for GKN represent the average participation of each shareholder in the two-unit plant; the shareholders have slightly different investments in the individual units GKN 1 and GKN 2.

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Figure 3

SERVICE TERRITORIES OF PRINCIPAL GERMAN UTILITIES

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Utility Participation in Uranium Supply

Figure 4 illustrates the ownership relationships connecting certain German utilities and the four German companies that own shares in major uranium production operations. Badenwerk and EVS jointly own 25 percent of Saarberg Interplan Uran GmbH (SIPU), a uranium exploration and supply company holding 3.75 percent of Energy Resources of Australia (ERA), the owner of the Ranger mine. Saarbergwerke AG, a Saarland coal company, owns 75 percent of SIPU. SIPU supplies over half the natural uranium requirement for the two-unit Philippsburg plant (owned by Badenwerk and EVS) with deliveries from Ranger.

RWE owns 6.25 percent of Ranger through its wholly-owned fuel subsidiary RBW (Rheinisch-Braunkohlenwerke AG, Germany's major coal producer). RBW also owns 75 percent of UEM (Uranerz Exploration and Mining Co.), which is a one-third partner in the Key Lake project, and also owns 50 percent of UEB (Uranerzbergbau GmbH). Thus, Ranger and Key Lake are RWE's principal long-term sources of uranium. In addition to these investments, RWE indirectly owns 10.5 percent of Steag AG, an energy group, which operates a subsidiary, Steag Kernenergie GmbH, that is an active trader in the spot uranium market and a participant in other fuel-cycle markets. Steag owns one-third of Urangesellschaft mbH (UG), an owner in ERA, Rossing (Namibia), and Somair (Niger). RWE also holds 45 percent of Nukem GmbH, which is active in the uranium spot market and in fuel fabrication, and which in turn owns 40 percent of Uranit GmbH, the German participant in the Urenco enrichment group.

Besides Steag's one-third share in UG, Metallgesellschaft AG, Germany's largest mining company, and Veba AG, one of the country's leading electrical groups, each own one-third of UG. Veba also owns 10.5 percent of Steag, so its effective interest in UG is slightly greater than one-third. The Veba group owns 86.6 percent of PREAG. Both PREAG and NWK have long-term contracts with UG for the supply of uranium and conversion to cover a portion of requirements. Three of UG's mining investments are now producing uranium commercially—Ranger, Rossing and Somair—and it has recently acquired facilities for U_3O_8 recovery from phosphoric acid. The facility, formerly operated by the Westinghouse uranium production subsidiary, had been shut down in mid-1981, but could produce U_3O_8 in the future.

PREAG also owns 40 percent of Uranit, the centrifuge company, and like RWE will purchase most of its long-term enrichment services from Urenco. It now appears that all of the principal German utilities will buy at least a portion of long-term enrichment requirements from Urenco. Urenco recently began operating its third commercial enrichment plant at Gronau in North-Rhine Westphalia (Figure 1). (The other two plants are in Almelo, the Netherlands, and Capenhurst, England.)

Aside from the special relationships outlined above, the German utilities have encouraged competition among domestic and non-German sellers of nuclear fuel. Even when one supplier already has a close relationship with a utility, some have diversified purchases in order to promote competitive pricing. Most utilities, however, currently have a bias for uranium supply furnished by European and African sources. This bias, attributable to the usual desire for domestic self-sufficiency, has been accentuated by various negative experiences with other governments. Most notable among those is the ill-advised US government attempt to regulate other countries' fuel-cycle activities through the Nuclear Non-Proliferation Act of 1978.

The German companies' independent commercial attitude is exemplified by their open approach to trade with the Soviet bloc nations and with developing countries. KWU is currently negotiating with the People's Republic of China for extensive cooperation in nuclear energy matters. One of the topics of negotiation is the possible development of a fuel-cycle trade between the two countries that could include the bartering of Chinese uranium and the delivery of German spent fuel to the PRC for long-term storage.

More relevant to the international uranium market, however, may be the increasing presence of the German nuclear fuel companies in the USA and Canada. While the German utilities have increasingly sought autonomy from US and Canadian suppliers, their associated fuel companies have become more and more active in the USA and Canada. In a market that traditionally has lacked dealer intermediaries, several well-financed German companies have created an international business in uranium trading. That business could be indicating the future direction of the nuclear fuel market.

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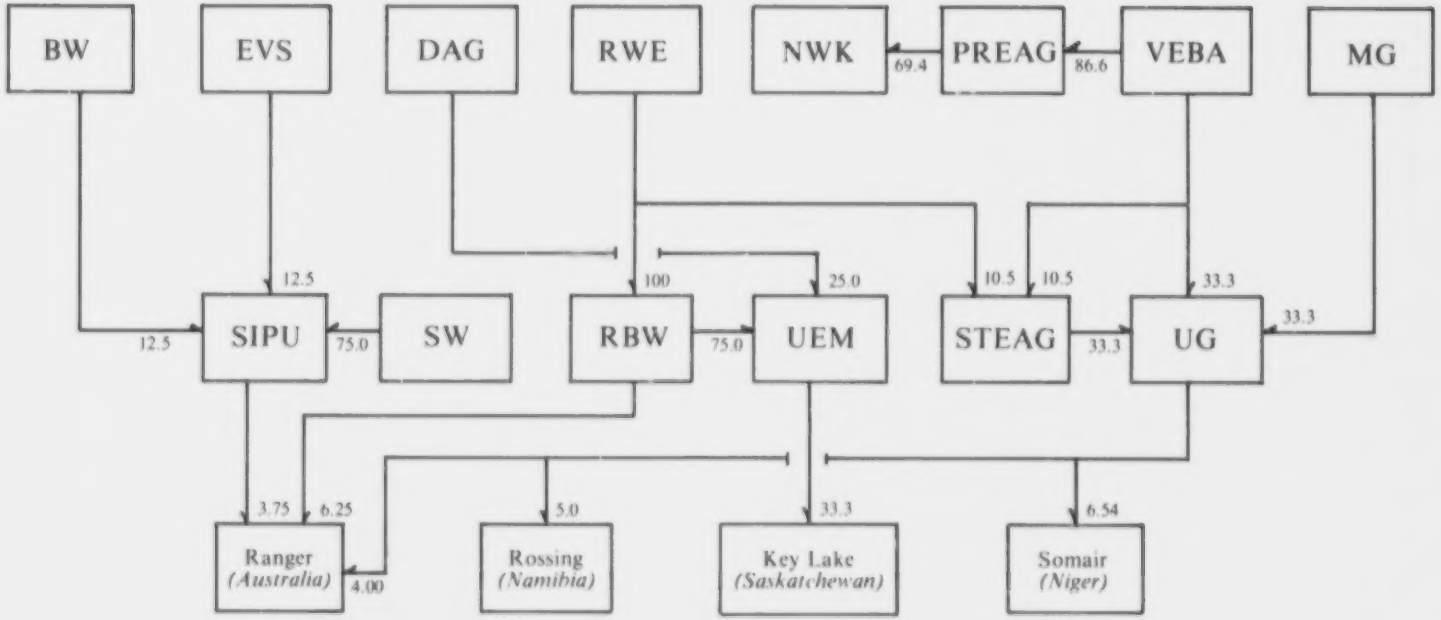
Figure 4

GERMAN OWNERSHIP IN ACTIVE URANIUM PRODUCTION OPERATIONS



BW	—Badenwerk AG	RWE	—Rheinisch-Westfaelisches Elektrizitaetswerk AG
DAG	—Deilmann AG	SIPU	—Saarberg Interplan Uran GmbH
EVS	—Energieversorgung Schwaben AG	STEAG	—Steag AG
MG	—Metallgesellschaft AG	SW	—Saarbergwerke AG
NWK	—Nordwestdeutsche Kraftwerke AG	UEM	—Uranerz Exploration & Mining Co.
PREAG	—Preussische Elektrizitaets AG	UG	—Urangesellschaft GmbH
RBW	—Rheinische-Braunkohlenwerke AG	VEBA	—Veba AG

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RECENT DEVELOPMENTS

CANADA

Maritime Nuclear, a government-owned company jointly formed by Atomic Energy of Canada and New Brunswick Electric Power Company, has deferred plans for the construction of Point Lepreau Unit 2. The 630-MWe Candu reactor would have been the first nuclear power plant ordered in North America since 1978. The company was created to establish the Point Lepreau Unit 2 project, and it invited contractor proposals in February 1984. Maritime Nuclear recently announced that it will scale down its operations until there is evidence that the energy will be needed. The company has spent $15 million on the project, and is planning staff reductions.

The second Point Lepreau unit originally was intended to supply power exclusively to US markets. However, declining electricity demand and rising construction costs discouraged investment by US utilities. In addition, more than fifteen New England utilities which already had invested in the troubled Seabrook plant were reluctant to support a Canadian project which could succumb to the same difficulties and might be unnecessary.

* * *

The partners of the Cigar Lake Joint Venture, Saskatchewan Mining Development Corporation (SMDC) (50.75 percent), Cogema Canada Ltd. (32.625 percent), Idemitsu Uranium Exploration Canada Ltd. (12.875 percent), and Corona Grande Exploration Corporation (3.75 percent) have announced the formation of a joint operating company called Cigar Lake Mining Corporation (CLMC). CLMC, located in Saskatoon, Saskatchewan, will be directed toward the identification of appropriate underground mining methods and milling processes for the extremely high-grade deposit located 115 kilometers northeast of Key Lake. The company at present consists of six professional engineers, and will be expanded to include geotechnicians and environmental specialists.

Cogema Canada made the initial Cigar Lake discovery in 1981. In February 1985, new test drilling results indicated that the reserves were of a higher grade and tonnage than previously estimated (see Report 199, p. 20). The average grade of 14-percent U_3O_8 (12-percent elemental uranium) may require special mining techniques in order to protect miners from high radiation levels. CLMC will be responsible for development of the project, which currently is in pre-development stages, consisting of environmental impact and technical mine engineering studies. CLMC anticipates costs of $4 million for the pre-development stage, and production is expected to begin in the early 1990s.

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UNITED STATES

Introduction

Three nuclear power units in the USA have begun commercial operation since the beginning of 1985, adding almost 3,300 MWe to US nuclear generating capacity (Table 3). Four other units with full-power operating licenses are expected to enter commercial operation during June. This would at mid-year account for exactly half of the fourteen units which Nuexco predicted would enter commercial operation during 1985. These developments are reinforced by the fact that four other reactors have received fuel-loading licenses and are performing low-power tests. Should three of those units enter commercial operation by the end of the year, the number of units entering commercial operation in 1985 will exceed the number of units which began operation in 1983 and 1984 combined. Table 4 lists US nuclear units nearing operation in 1985-86.

A recovery or stabilization of the US nuclear power industry has not been evident at least since early 1983. Even at that time, cancellations, deferrals, and construction delays constituted much of the activity; almost twice as many units were canceled in 1983 as began commercial operation. Continuing that trend, more units were officially canceled than began commercial operation in 1984. Except for the troubled Midland and Seabrook plants, however, there are few likely cancellations in the remaining months of 1985. LILCO's Shoreham unit continues to suffer from regulatory obstructions that will prevent the operation of the plant for an indefinite length of time, but because construction is complete, the likelihood of its eventual operation is high.

Commercial Operations

After years of litigation and plant modifications, Pacific Gas & Electric's (PG&E) Diablo Canyon Unit 1 began commercial operation on May 7, 1985. The utility received a full-power license in August 1984, and power ascension

Table 3

US NUCLEAR UNITS' LICENSING STATUS IN MID-1985

Unit	Lead Utility	MWe Net	Type	COD[1]
Commercial Operation				
Susquehanna 2	Pennsylvania P&L	1050	BWR	Feb 1985
Callaway 1	Union Electric	1150	PWR	Mar 1985
Diablo Canyon 1	Pacific G&E	1084	PWR	May 1985
Total		3,284		
Full-Power Operating License				
Byron 1	Commonwealth Edison	1120	PWR	Jun 1985
Catawba 1	Duke Power Co.	1145	PWR	Jun 1985
Grand Gulf 1	Mississippi P&L	1250	BWR	Jun 1985
Waterford 3	Louisiana P&L	1104	PWR	Jun 1985
Palo Verde 1	Arizona PS	1270	PWR	Dec 1985
Total		5,889		
Fuel-Loading and Low-Power-Testing License				
Fermi 2	Detroit Edison	1100	BWR	4Q 1985
Limerick 1	Philadelphia Elec.	1055	BWR	4Q 1985
Wolf Creek	Kansas G&E	1150	PWR	Sep 1985
Diablo Canyon 2	Pacific G&E	1106	PWR	Dec 1985
Total		4,411		

[1]Commercial Operation Date, based on utility forecasts and published information.

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tests began after federal appeals courts reviewed the case and refused to uphold opponents' objections. In addition, Union Electric Company's Callaway Unit 1, a 1,150-MWe PWR, and Pennsylvania Power & Light Company's Susquehanna Unit 2, a 1,050-MWe BWR, began commercial operation in the first quarter of this year.

Full-Power and Fuel-Loading Licenses

Five utilities have full-power operating licenses for their units; the NRC granted a license to Middle South Utilities for the Grand Gulf Unit 1 in August 1984. Duke Power Company (Catawba Unit 1), Louisiana Power & Light Company (Waterford Unit 3), and Commonwealth Edison Company (Byron Unit 1) all received full-power licenses in early 1985. Arizona Public Service received a full-power license with a five-percent power restriction in December 1984 for its Palo Verde Unit 1, and the power restriction was lifted at the end of May, allowing full-power ascension to proceed. The first four utilities are expected to begin commercial operation in June 1985. In addition, four more units have begun testing under fuel-loading and low-power testing licenses. They include PG&E's Diablo Canyon Unit 2, which has escaped much of the controversy surrounding Unit 1, and Philadelphia Electric Company's Limerick Unit 1, the first of a two-unit plant. The utilities anticipate that all of these plants will begin commercial operation by the end of 1985.

* * *

Representative Frank Guarini (D-N.J.) and five other Congressmen in May introduced legislation which would impose a tariff on UF_6 imported from any country that requires the upgrading of uranium mined in that country into UF_6 before export. Canada is the only country with

Table 4

US NUCLEAR PLANTS NEARING OPERATION IN 1985-86

Unit	Utility	MWe Net	Type	Percent Complete	COD[1]
Byron 1	Commonwealth Edison	1120	PWR	100	Jun 1985
Catawba 1	Duke Power Co.	1145	PWR	100	Jun 1985
Grand Gulf 1	Middle South	1250	BWR	100	Jun 1985
Waterford 3	Louisiana P&L	1104	PWR	100	Jun 1985
Wolf Creek	Kansas G&E	1150	PWR	100	Sep 1985
Shoreham[2]	Long Island Lighting	820	BWR	100	Oct 1985
Fermi 2	Detroit Edison	1100	BWR	100	4Q 1985
Limerick 1	Philadelphia Elec.	1055	BWR	100	4Q 1985
Watts Bar 1	TVA[3]	1177	PWR	100	4Q 1985
Palo Verde 1	Arizona PS	1270	PWR	100	Dec 1985
Diablo Canyon 2	Pacific G&E	1106	PWR	100	Dec 1985
Comanche Peak 1	Texas Utilities	1150	PWR	99	Dec 1985
Palo Verde 2	Arizona PS	1270	PWR	99	4Q 1986
Perry 1	Cleveland Electric	1205	BWR	98	Dec 1985
River Bend 1	Gulf States Utilities	940	BWR	97	Dec 1985
Hope Creek 1	Public Service E&G	1170	BWR	97	mid-1986
Palo Verde 3	Arizona PS	1270	PWR	96	mid-1987
Millstone 3	Northeast Utilities	1150	PWR	95	May 1986
Catawba 2	Duke Power Co.	1145	PWR	95	Sep 1986
Clinton 1	Illinois Power	933	BWR	93	Jul 1986
Shearon Harris 1	Carolina P&L	900	PWR	90	Sep 1986
Nine Mile Point 2	Niagara Mohawk	1080	BWR	89	Oct 1986
Braidwood 1	Commonwealth Edison	1120	PWR	80	Oct 1986
Byron 2	Commonwealth Edison	1120	PWR	67	Oct 1986

[1]Commercial Operating Date, based on utility forecasts and published information.
[2]A low-power license granted to the Shoreham plant was revoked in March 1985 by the Atomic Safety and Licensing Board. The plant's operation depends on the acceptance of its emergency plan, and the overcoming of other obstacles.
[3]TVA = Tennessee Valley Authority.

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such a policy, but in recent years the Canadian government has granted some exemptions, allowing certain US utilities having long-term contracts with US converters to take their deliveries of Canadian uranium in the form of concentrates rather than UF_6.

The House bill would require a $3.00 per pound UF_6 tariff on all upgraded uranium imported from countries requiring domestic conversion. UF_6 imported from countries having no such policy would be duty-free. The impetus behind the bill included a perception that Canada's exceptions to its policy were becoming too limited and scarce. However, at a Canadian producers meeting in March 1985, the producers agreed to grant the exemptions automatically until utilities' US conversion contracts expire. This apparently contradictory situation can be viewed as an attempt to protect the US converters' markets when their contracts have expired. It might be a way of encouraging US utilities to sign new contracts with the converters in order to assure the option of obtaining Canadian U_3O_8.

In addition, the overcapacity at the US conversion facilities undoubtedly motivated the converters to seek some protectionist measures from Congress. Eldorado Nuclear also has far too much capacity, having tripled its conversion facilities at Port Hope, Ontario with the completion of a new UF_6 plant last year. As Canadian production rose to become the largest in the world, Eldorado added conversion capacity to keep pace, while assuming that the government's upgrading policy would remain in effect.

If the bill were enacted, it would strengthen the US converters' positions in renegotiating contracts with US utilities. This is evident considering overseas converters have limited impact on the US market due to transportation costs, and because US utilities would be discouraged from obtaining Eldorado contracts due to the $3.00 tariff. In addition, conversion market competition would diminish, resulting in higher prices paid for conversion than would have been in effect, absent government interference. The oversupply in the conversion market would prevent any shortage of conversion services.

For these reasons, the chances of the bill passing are slim. It will go to the House Subcommittee on Trade, under the House Ways and Means Committee, for comment in June. There are indications that the Canadians are not overly concerned that the bill will pass, and are aware of the length of time the measure will take to gain support. In addition, they feel that the US utilities would probably apply pressure on Congress to reject the measure. Canada is not likely to mount a strong challenge through US-Canadian trade channels. It also is unlikely that the Canadian government's policy will change; in actuality, exemptions are likely to disappear as US utilities' contracts with US converters begin to expire.

CORRECTION

In the 1984 Annual Review, Nuexco incorrectly implied that Queensland Mines Ltd. (QML) had ceased production operations at its Nabarlek project (page 13). That passage should have read "Nabarlek has ceased *mining* operations." In actuality, QML plans to continue *milling* ore at least until the end of 1988. Similarly, in the World Uranium Production section (page 11), the reference to Nabarlek should have read "... the completion of Queensland Mines Ltd. *mining* at Nabarlek means that Australian production cannot be expected to equal its 1982 peak ..."

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RAW MATERIALS

URANIUM MINES IN THE USSR

Introduction

Four mining districts in the USSR have been the major source of uranium production within the country. An additional four or five production centers have been less prolific, but their combined capacity has proven essential to total uranium supply. Uranium usually is recovered through by-product or co-product mining operations. Uranium requirements are supplemented by unknown quantities imported from various CMEA (Council for Mutual Economic Assistance) countries, primarily Czechoslovakia and Romania.

The first sustained uranium recovery operation began in 1908 at the Tyuya-Muyun mine located in the northern Alai Mountains of the Uzbekistan district near the border of China and Afghanistan (Figure 5). More than 900 tonnes of uranium concentrates were recovered as a by-product of copper and vanadium mining during the next seven years. Uranium was recovered almost continuously during the regular mining operation until the late 1950s. The present status of the project is uncertain, but adjacent mines and others in the northern sector of the Chatkal/Ferghana region are currently producing by-product uranium, primarily from fluorspar ores and lignite.

A rich mineral trend extends northward from the Tyuya-Muyun mine area to the Ferghana region, continuing northward into the province of Kazakhstan. Copper has been mined there for many years. Uranium mineralization occurred in association with the copper ore and has been recovered as a co-product since the late 1950s. The mineralized complex contains extremely large tonnage of highly disseminated copper and uranium ore, indicating that the mine is likely to be a long-term supplier of uranium.

One of the most important production centers lies in the northern sector of the Krivoi Rog iron district in Dnepropetrovsk Province of west-central Ukraine. Uranium mining began at the Terny and Zholtye Vody mines in the mid-1940s, one of the country's first production centers. Originally, uranium was the primary product at both mines, but later became a co-product of iron production. Although the Terny mine was closed in 1969, the Zholtye Vody mine continues to produce. (The district is described in Report 194, page 21.)

Molybdenum and uranium are co-produced at mines in several districts primarily in western and central USSR. Uranium from this source is considered important to the total supply program because of the wide distribution of occurrences. However, the total number of mining centers, annual production capacities, and specific geographic locations are unknown. Only brief references to the geologic and mineral associations of such mining projects can be found.

Chatkal/Ferghana District

At the Tyuya-Muyun mine, complex mineralization was discovered about 1899 in a host of metamorphosed limestone of Paleozoic age. Geologic evaluation of the area began almost immediately, which resulted in the discovery and delineation of an extensive and highly mineralized vein system associated with hydrothermal alteration along prominent structural features. The configuration of mineralization consists of a central core of massive barite veins containing copper, vanadium and uranium. Five or six major veins and a number of intermediate veinlets form a radial pattern away from the core. The largest veins are 1,600 to 2,000 meters in length. The first mine began to recover copper, vanadium and barite in 1908. Originally, uranium was removed from the mineral concentrate because of the need to purify the other products. It was used sparingly in the glass and ceramic industries, and as one of the main sources of radium in the USSR. From the late 1940s to the present, it has been an important source of U_3O_8 for the domestic nuclear industry.

In the early years of mine life, the relatively high-grade ore averaged almost four percent copper, 2.5 percent vanadium, and approximately one percent uranium. The average grade of mined uranium over the years is not known, but it was inferred that a large ore reserve remained and the average uranium content was 1.5 percent U_3O_8, with high-grade zones exceeding 4.0 percent. The main uranium mineral is tyuyamunite, a calcium, uranium vanadate, named for the mine site on Tyuya-Muyun hill. Tyuyamunite and carotite mineralization formed along veins occupied by the other minerals. The uranium minerals tend to be concentrated, by quantity and grade, in cavities created by the action of hydrothermal solutions moving through the vein system during the mineralizing epoch. Many select mineral specimens have been collected from the cavity areas.

Most mining has been performed using underground methods. Mines have been developed at strategic locations on the different vein structures. The deepest mines exceed 500 meters in depth and in some cases are con-

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Uranium Mining Districts:

1. Sillimae
2. Zholtye Vody
3. Lermontov
4. Central Ural Mountains
5. Uchkuduk
6. Chatkal/Ferghana
7. Vikhorevka
8. Lake Baykal
9. Krasnokamensk

Figure 5. Location map of uranium mining districts in western and central USSR. Each district represents one or more production centers. (Adapted from R.S. Mathiason, 1980.)

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nected by lateral workings. The mined ores are shipped to Chkalovsk via the Great Ferghana Canal for processing. Uranium concentrate is recovered from the ores and is further processed at a nearby conversion plant.

There are 25 to 30 other active mines in the Chatkal/Ferghana district, in which uranium is either the primary mineral recovered or a by-product. The district is the largest source of uranium in the USSR. The mines at Taboshar and Maylisay produce uranium disseminated in a sandstone formation. Each mine has its own processing plant. The uranium content varies from about 0.10 percent to 0.20 percent. High-grade ore occurs in lenses of coarse sandstone, sometimes associated with depositional breaks consisting of shale or mudstone stringers and along faults and fractures associated with contact metamorphism and alteration. In the nearby Kara-Tau mountains, uranium is associated with copper and vanadium at the Bela Sauskandyk mine. Pitchblende is the dominant uranium mineral present; secondary uranium minerals often are associated with zones of intense hydrothermal alteration.

On the northern flanks of the Kurama mountains are a number of mines from which uranium is recovered as a by-product of fluorspar, copper and lignite. The Naugarzan mine is the largest fluorspar and uranium mine in the district. Mining began in 1964 in an area where mineralization occurs primarily in a steeply dipping vein system associated with caldera-type depressions and related faulting. The host rocks consist of interbedded sediments (tuffaceous sandstones and gravels) and volcanics that fill structural depressions.

In the caldera environment, mineralization has developed in three types of deposits. The most common type is steeply dipping vein systems directly influenced by structural conditions in volcanic cover rocks and Paleozoic granites. Next, stockwork deposits occur along major faults and fractures. The third type of deposit is stratabound in the undisturbed sedimentary sequence filling caldera-related basins. In each case, the principal uranium mineral is pitchblende. The mined ores are shipped directly to a fluorspar mill located at Toytepa; a rough uranium concentrate is separated from the fluorspar and shipped directly to the uranium mill at Chkalovsk.

Uranium is recovered as a by-product from lignite burning in at least three different locations. The Min-Kush and the Tsentralnaya mines are located in the southern portion of the district, the Almalyk mine is located about 20 kilometers north of Osh. The latter is the largest mine. It began open-pit production in 1962 and has maintained an annual production level of just over 180,000 tonnes of lignite. The Min-Kush mine is also an open pit, producing about 120,000 tonnes per year. Initial production at the Tsentralnaya mine was about 90,000 tonnes per year using underground mining methods. Open-pit mining of the deposit began about 1970, and the annual production level is well over 100,000 tonnes. The ash from each project is leached at a nearby plant to recover the uranium. The concentrate subsequently is transported to the conversion plant located at Kara-Belta. The Kara-Belta plant has been the main conversion facility for the southern district since the early 1950s.

In the central part of the district, uranium is recovered as a by-product from lead ore mined at the Bordunskiy, Ak-Tyuz, and Orlovka mines. The uranium is recovered at the Kirgiziya metallurgical complex located near Orlovka, probably using flotation techniques. Finally, uranium is recovered as a co-product from gold ores produced at several mines situated in the Kyzyl Dzhar mining district. It is likely that the gold ores are processed at the Kirgiziya complex, and the uranium is separated from the ore by flotation. Also, the uranium concentrate is probably leached and precipitated as ammonium diuranate (ADU).

The northern sector of the Chatkal/Ferghana district has only recently developed into an important uranium-producing area. In the southern Kazakhstan republic, an extensive mineralized trend has been discovered to contain a variety of minerals. Most important are the vast reserves of porphyry-type copper mineralization disseminated throughout metamorphic and igneous rock hosts, much of which is known to contain significant quantities of uranium. Open-pit and underground mines have been developed along the trend where copper is the primary mineral mined. Uranium is a co-product in at least five of the mines, but production rates for the district are not known.

The largest uranium production center may be the Stepnogorsk mine located northeast of Tselinograd. Uranium and copper occur in a vein system containing considerably higher grade than the disseminated ores. Placement of the ore is related to structural events. It is concentrated along the resulting fault and fracture patterns. The mining utilizes underground methods.

Other uranium mines include the Koktas, Kiyakhty, Aksuyek and Akbakay mines located to the south near Lake Balkash. Each is an open-pit mine where low-grade uranium is mined as a co-product of copper. The rough uranium concentrate from the five mines is collected for

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shipment to the Tseliny Mining and Chemical Complex near Stepnogorsk. Uranium concentrate is shipped elsewhere for further processing.

Other Uranium Districts

Molybdenum-uranium deposits are found in a variety of geologic settings. Most occur in association with hydrothermal mineralization related to sedimentary deposition in close proximity to volcanic and intrusive rocks of Paleozoic age. Primary mineralization is disseminated in the volcanics and intrusives. Diorite dikes and volcanic pipes and plugs are frequently mineralized. The mineral suite may contain uranium and sulfide minerals such as molybdenite, galena and pyrite. Higher-grade ores often are found near intrusive contact zones and in sediments. Zones of contact metamorphism, especially in sediments (sandstones and conglomerates), are highly favorable for ore accumulation.

Pitchblende is the main uranium mineral present, forming low-grade ore where disseminated, and often increasing in percentage at the contact zone and within the sediments. The most important deposits are situated where rock structure has been influenced by hydrothermal activity adjacent to fault and fracture zones. The mineralization is confined to vein systems, veinlets and in stockworks where intense alteration has taken place.

Low-grade molybdenum-uranium occurrences have been discovered in Proterozoic rocks of the Siberian and Aldan shield regions. The mineral accumulation probably is the result of precipitation from hydrothermal solutions invading intensely fractured rock. Titanium and iron are common mineral constituents in the more complex occurrences. The Soviets have attempted solution mining in areas of advanced rock alteration where porosity and permeability suggest favorable leaching conditions. Neither the magnitude nor the success of the leaching operation is known. However, solution mining technology has advanced in the USSR, and it is likely that the application of solution mining will become more prominent, especially for the exploitation of large, low-grade deposits.

Uranium is recovered as a by-product of phosphoric acid production at Sillimae near the Baltic Sea coast in Estonia. It is the largest phosphate-uranium operation in the USSR. Uranium is contained primarily in fish bone detritus common to the phosphate deposit. The uranium values are low, recorded in a range of approximately 40 to 90 parts per million in the phosphate-bearing rock. However, the demonstrated association between uranium and the detritus material suggests that higher U_3O_8 percentages are likely to occur where the detritus has accumulated as a result of depositional changes.

The recovery of uranium from the phosphate begins with the acidulation of the phosphate rock. In this wet process, the phosphate is completely digested by sulfuric acid. Under ideal conditions, approximately 90 percent of the contained uranium is stripped from the acid stream through the application of basic solvent extraction technology. The amount of U_3O_8 recovered annually from this operation is not public information. The only certainty is that large quantities of phosphatic fertilizer and uranium are manufactured annually and vast ore reserves assure the project's longevity.

Uranium also is recovered from the waste water generated during the refining process of petroleum products from the Ukhta oilfields located in the Pechora Basin, in the northern part of Western USSR. Uranium and radium metals contained in the oil are taken into solution and remain there through the final stage of refinery use. The metals are recovered by precipitation from the process water. Uranium production levels are not known, but oil production amounts to millions of barrels annually, suggesting that uranium recovery from this project is high.

Summary

The mines described represent only a portion of the total number of active uranium mines in the USSR. Mines not listed are assumed to be smaller, less important projects. Potentially, a number of properties remain unidentified and are lost in the speculation surrounding uranium resource and supply capabilities of the USSR. It is possible that some reserves are not tabulated as part of the overall uranium supply situation in the USSR because information about some of the large production centers has not been released outside of the country.

Eight processing plants are noted in this article as receiving ore from specific mines or groups of mines; there are at least ten plants in the USSR, including two chemical and metallurgical plants, that produce uranium concentrate. The concentrate is shipped from the milling facilities to any of three conversion plants. The original is at Zholtye Vody in the Ukraine, the second is at Chkalovsk in the southern Ferghana district, and the third is at Kara Belta in northern Kirgiziya. Uranium hexafluoride is transported from the conversion plants to one of two enrichment plants. The main plant is at Zholtye Vody, and another is located at Chkalovsk. Production capacities of all conversion and enrichment plants are not available.

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HISTORICAL MARKET DATA

EXCHANGE AND TRANSACTION VALUES SINCE JANUARY 1980

Determined as of the last day of the month indicated

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HISTORICAL EXCHANGE VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1968	—	—	—	—	—	—	—	6.35	6.35	6.40	6.45	6.50
1969	—	6.35	6.10	6.10	6.25	6.25	6.20	6.20	6.15	6.15	6.15	6.20
1970	6.30	6.30	6.30	6.30	6.30	6.30	6.30	6.20	6.15	6.15	6.15	6.15
1971	6.20	6.20	6.20	6.20	6.15	6.05	6.00	5.95	5.95	5.95	5.95	5.95
1972	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
1973	5.95	6.00	6.10	6.20	6.45	6.50	6.50	6.50	6.50	6.50	6.75	7.00
1974	7.70	7.90	8.00	9.00	9.50	10.50	11.50	12.00	12.50	14.00	14.75	15.00
1975	16.00	16.00	18.00	20.00	21.00	23.00	24.70	26.00	26.00	28.50	30.00	35.00
1976	32.50	37.00	39.25	40.00	40.00	40.00	40.00	40.40	41.00	41.00	41.50	41.00
1977	41.35	41.50	41.60	41.60	42.00	42.25	42.25	42.25	42.40	42.75	43.20	43.20
1978	42.90	43.25	43.25	43.25	43.40	43.40	43.40	43.10	43.25	43.00	43.25	43.25
1979	43.25	43.25	43.25	43.25	43.25	43.00	42.70	42.70	42.20	42.20	41.00	40.75
1980	40.00	38.00	35.00	32.00	32.00	31.50	31.50	30.00	28.50	28.00	28.00	27.00
1981	25.00	25.00	25.00	25.00	25.00	24.25	23.50	23.50	23.50	23.50	23.50	23.50
1982	23.00	23.00	22.50	20.75	20.50	19.25	18.25	17.00	17.00	17.50	19.75	20.25
1983	21.50	21.75	22.25	23.25	23.50	23.50	24.00	24.00	24.00	23.50	22.50	22.00
1984	20.50	17.50	17.00	17.75	17.75	17.50	17.50	17.50	17.50	16.00	15.50	15.25
1985	15.00	15.00	15.00	14.25	**15.00**							

HISTORICAL TRANSACTION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U_3O_8)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	—	—	—	—	39.60	39.70	39.70	40.40	40.30	40.60	40.70	40.70
1977	41.30	41.30	41.40	41.50	42.80	42.90	43.00	42.60	42.50	42.80	42.90	42.90
1978	43.10	43.30	43.70	43.60	43.60	43.20	43.30	43.40	43.40	43.60	43.40	43.70
1979	43.60	43.80	43.70	43.40	43.60	43.70	43.70	43.60	43.60	43.60	43.50	42.30
1980	42.00	39.30	38.60	38 40	37.90	37.60	37.30	31.60	30.60	29.00	28.70	27.70
1981	27.20	27.20	27.00	25.70	25.70	24.50	24.40	24.30	23.90	24.10	24.10	24.00
1982	24.00	23.70	23.40	22.60	22.70	21.50	20.30	19.10	17.30	17.00	17.55	18.80
1983	19.35	20.00	21.35	21.40	22.35	22.45	23.50	23.60	23.65	23.65	23.85	23.85
1984	23.05	22.50	19.25	17.90	17.00	16.50	16.60	16.40	16.55	16.05	15.90	15.90
1985	16.20	15.70	15.05	14.90	**14.45**							

HISTORICAL CONVERSION VALUES

Determined as of the last day of the month indicated (US Dollars/lb. U as UF_6)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1981	1.20	1.20	1.20	1.40	1.15	1.15	1.15	1.10	1.10	1.10	1.20	1.20
1982	1.20	1.20	1.20	1.20	1.00	1.00	1.00	0.90	1.10	1.60	1.45	1.45
1983	1.20	1.40	1.40	1.20	1.20	1.20	1.10	1.10	1.00	0.60	0.60	0.60
1984	0.60	0.30	0.80	0.80	0.80	0.00	0.00	0.80	1.00	1.00	0.80	0.80
1985	1.00	1.00	1.00	1.50	**1.50**							

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GOVERNMENT STATISTICS

AUSTRALIA

	Price Index of Materials Used in Manufacturing Industry—All Groups[1] (1969=100)	Award Rates of Pay Indexes Australia—Adult Males In Mining Wage and Salary Earners, Weekly Rates[2] (1976=100)
1983 Avg.	401.2	181.8
Jan 1984	399.2	188.6
Feb 1984	402.5	188.5
Mar 1984	403.9	188.3
Apr 1984	404.2	196.2
May 1984	403.8	197.0
Jun 1984	404.9	197.0
Jul 1984	408.5	197.0
Aug 1984	413.3	197.0
Sep 1984	412.1	197.0
Oct 1984	408.6	197.0
Nov 1984	407.3	197.0
Dec 1984	406.0	197.0
Jan 1985	409.4R	197.0
Feb 1985	415.6	197.0
Mar 1985	—	197.0

P = Preliminary R = Revised since last month

CANADA

	Industry Selling Price Index: Manufacturing[1] (1971=100)	Wage-earner Data: Average Hourly Earnings (C$)[2] Uranium Mines (SIC 057)	Metal Mines* (SIC 051-059)	Mines, Quarries and Oil Wells[3] (SIC 051-099)	Primary Metal Industries Non-ferrous[4] (SIC 296)	(SIC 298)	Chemicals and Chemical Products[5] (SIC 372-379)
1983 Avg.	298.8	—	—**	14.30	—	—	11.17
Jan 1984	305.4	17.74	15.27	14.74	11.91	10.84	11.69
Feb 1984	306.6	17.78	15.59	14.90	12.04	10.82	11.51
Mar 1984	308.7	18.05	15.52	14.82	12.14	10.84	11.58
Apr 1984	310.5	18.06	15.83	15.10	11.96	10.34	11.63
May 1984	310.6	18.48	15.64	15.06	12.11	10.16	11.65
Jun 1984	311.0	18.08	15.48	14.80	12.38	10.40	11.66
Jul 1984	312.7	17.81	15.72	14.92	12.53	10.18	11.82
Aug 1984	312.7	17.24	15.36	14.92	12.44	10.34	11.78
Sep 1984	312.3	17.68	15.96	15.34	12.51	10.52	11.90
Oct 1984	312.3	17.64	16.15	15.26	12.69	10.56	11.96
Nov 1984	313.6	18.04	16.13	15.43	12.47	10.51	11.96
Dec 1984	314.2	17.95	16.39	15.60	12.16	10.40	11.99
Jan 1985	315.8	18.05	16.13	15.60	12.32	10.80	12.04
Feb 1985	316.4	18.78R	16.41R	15.68R	12.52R	11.05R	12.06R
Mar 1985	317.5	18.24P	16.17P	15.57P	12.51P	10.83P	11.95P

P = Preliminary R = Revised since last month

For annual averages prior to 1983, and for notes pertaining to these statistics, see pages 23-26 of Report 190 of June 1984.

*The 1980 average for Metal Mines was incorrectly reported as 10.59. The correct average is 10.58 (see Report 190).

**Two different methods were used in the 1983 "Metal Mines" category in reporting survey data, and Statistics Canada did not publish a 1983 average. The March 1983 figure for the old method was 14.73 and for the new method was 14.84. The published average for 1983 in Report 190 was a Nuexco calculation based on the available monthly statistics for 1983 with the exception of the March figure, where only the 14.84 value was taken into account.

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REPUBLIC OF SOUTH AFRICA

GOVERNMENT STATISTICS

	Average Declared Working Costs per per Metric Ton of Gold Ore Milled (Rand)[1]	Tonnage-Weighted Index of Average Working Costs per Metric Ton of Gold Ore Milled (March 1982=100)[2]	Consumer Price Index[3] (1975=100)[4]	Producer Price Index All Groups[5] (1975=100)	Total Employment in Mining and Quarrying (Code 35)[6]	Total Salaries and Wages in Mining and Quarrying (1,000 Rand) (Code 40)[6]
1983 Avg.	51.87	115.0	262.2	274.8	696,579	3,644,772
Jan 1984	—	—	274.7	283.3	689,807	326,619
Feb 1984	—	—	278.4	286.5	702,553	335,906
Mar 1984	55.30	123.1	281.9	288.0	715,628	342,332
Apr 1984	—	—	286.1	290.2	712,963	327,550
May 1984	—	—	288.3	292.6	710,040	327,937
Jun 1984	56.95	126.2	291.2	295.3	717,009	347,121
Jul 1984	—	—	295.1	296.0	717,121	369,964
Aug 1984	—	—	297.0	300.8	721,905	361,357
Sep 1984	60.64	133.2	299.9	304.1	721,470	359,218
Oct 1984	—	—	303.7	308.7	717,865	363,755
Nov 1984	—	—	307.4	312.8	717,396	369,771
Dec 1984	62.92	138.6	309.4	315.9	701,198	365,234
Jan 1985	—	—	177.1*	166.6*	—	—
Feb 1985	—	—	182.8*	171.3*	—	—
Mar 1985	64.48	142.4	183.6*	173.0*	—	—
Apr 1985	—	—	187.4*	—	—	—

*The basis for calculation for these indices has been revised to January 1980 = 100.

UNITED STATES

	Producer Price Index[1]		Consumer Price Index[2]	GNP Implicit Price Deflator[3]	Gross Average Hourly Earnings of Production or Non-supervisory Workers (US$)[4]			
	Industrial Commodities (1967=100)	All Commodities (1967=100)	(1967=100)	(1972=100)	Metal Mining (SIC 10)	Primary Non-ferrous Metals (SIC 333)	Chemicals and Allied Products (SIC 28)	Electric and Electronic Equipment (SIC 36)
1983 Avg.	315.8	303.1	298.4	215.63	12.57	13.43	10.59	8.65
Dec 1983	318.4	306.1	303.5	218.53	12.75	13.33	10.90	8.84
Jan 1984	319.1	308.0	305.2	—	12.67	13.38	10.91	8.88
Feb 1984	320.6	308.9	306.6	—	12.81	13.34	10.90	8.86
Mar 1984	321.9	311.0	307.3	220.58	12.85	13.33	10.95	8.88
Apr 1984	322.5	311.4	308.8	—	12.91	13.30	10.97	8.89
May 1984	323.3	311.7	309.7	—	12.99	13.37	11.02	8.89
Jun 1984	323.9	311.4	310.7	222.40	12.96	13.40	11.03	8.91
Jul 1984	324.0	312.0	311.7	—	13.02	13.36	11.12	8.95
Aug 1984	323.5	310.9	313.0	—	13.10	13.51	11.13	9.00
Sep 1984	322.3	309.5	314.5	224.57	13.20	13.39	11.23	9.08
Oct 1984	323.2	309.4	315.3	—	13.23	13.53	11.32	9.09
Nov 1984	323.8	310.4	315.3	—	13.23	13.76	11.35	9.15
Dec 1984	323.0	309.9	315.5	226.10	13.28	13.66	11.37	9.27
Jan 1985	323.2	309.8	316.1	—	13.25	13.71	11.42	9.28
Feb 1985	322.5	309.2	317.4	—	13.27R	13.74	11.42	9.28R
Mar 1985	322.6	308.7	318.8	229.01	13.20P	13.99P	11.40R	9.34
Apr 1985	323.8	309.3	320.1	—	—	—	11.50P	9.33P

P = Preliminary R = Revised since last month

For annual averages prior to 1983, and for notes pertaining to these statistics, see pages 23-26 of Report 190 of June 1984.

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